

ings were ordered on the 24th, and on the 28th northwest warnings were displayed on Lake Superior and northeast warnings on Lakes Michigan and Huron. The warnings were continued for forty-eight hours. This storm was not as severe as those which occurred earlier in the month. No wrecks of any kind were reported and it is thought that advantage was taken of the warnings in every case.

Unseasonably cold weather overspread the district during the latter part of the month and forecasts of freezing temperature were made on April 30 for the eastern and southern portions of the forecast district. The conditions were sufficiently severe to cause a flurry in the grain market, the prices rising decidedly as the result of the cold weather, as it was thought that considerable damage would be done.—*H. J. Cor, Professor of Meteorology.*

DENVER FORECAST DISTRICT.

Special warnings were issued well in advance of the cold snap that visited western Wyoming and Utah on the 2d and of the killing frost that occurred in western Colorado on the morning of the 5th. Warnings were also issued on the morning of the 10th for the killing frost that occurred in Utah on the 11th, and on the 29th for the severe freeze in southeastern Colorado and northern New Mexico. Vegetation was far advanced in the last-named districts and great damage resulted to fruit, gardens, etc.

Notices of light frosts were frequently included in the forecasts for such localities as the progress of vegetation warranted.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month opened with a marked depression over Utah, accompanied by heavy rains over southern and central California, with snow in the mountains. The precipitation was also heavy in northern Arizona, the twenty-four hour rainfalls at Flagstaff on April 1 and 2 being 2.78 inches and 1.50 inches, respectively. In California, especially in the southern portion, rainfalls from 1 to 2 inches were recorded.

A persistent high off the coast of northern California and Oregon prevailed from April 2 to 9. A moderate depression over Nevada and Utah appears to have extended westward, overlying the Sierras and causing unsettled weather with showers generally in California on April 10.

The first reports from Southeast Farallon, 27 statute miles west of San Francisco, were received on April 17, a submarine cable having been successfully laid April 10 to 14.

Unsettled weather prevailed on April 16 and 17. At Los Angeles a twenty-four hour rainfall of 2.94 inches was reported on April 17. The remainder of the month was free from any marked disturbance.—*A. G. McAdie, Professor of Meteorology.*

PORTLAND, OREG., FORECAST DISTRICT.

In this district the month was dry and slightly cooler than usual, with no damaging storms. High winds occurred along the coast on the 6th and 7th for which warnings were issued in time to be of benefit to outgoing vessels.

During the latter part of the month frosts, which were accurately forecast, seriously damaged the peach crop of southern Oregon. Preventive measures, such as smudging, spraying, direct heating, etc., are not generally employed by horticulturists in this district and but few availed themselves of the opportunity presented by the warnings to protect their crops.—*Edward A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.	3, p. m.	47	97	7, a. m.	47	60	<i>Miles.</i> 2,450	<i>Days.</i> 3.5	<i>Miles.</i> 700	<i>Miles.</i> 29.2
II.	11, a. m.	45	124	14, a. m.	41	101	1,225	3.0	408	17.0
III.	13, p. m.	47	101	18, a. m.	37	83	1,775	4.5	394	16.4
IV.	17, p. m.	38	123	20, p. m.	49	87	2,400	3.0	800	33.3
V.	21, p. m.	41	105	24, p. m.	30	82	1,700	3.0	567	23.6
VI.	21, p. m.	38	123	29, p. m.	27	80	4,250	8.0	531	22.1
VII.	25, a. m.	38	123	28, a. m.	48	123	850	3.0	283	11.8
VIII.	28, a. m.	53	108	29, a. m.	49	100	450	1.0	450	18.8
IX.	29, a. m.	38	123	*2, a. m.	48	122	750	3.0	250	10.4
X.	29, p. m.	41	105	*2, p. m.	47	60	2,600	3.0	867	36.1
Sums.							18,450	35.0	5,250	218.7
Mean of 10 paths.							1,845		525	21.9
Mean of 35.0 days.										22.0
Low areas.										
I.	1, a. m.	43	109	3, a. m.	49	69	2,000	2.0	1,000	41.7
II.	2, a. m.	37	105	4, p. m.	45	66	2,250	2.5	900	37.5
III.	3, a. m.	53	117	7, a. m.	49	89	1,950	4.0	488	20.3
IV.	6, p. m.	32	106	9, a. m.	44	67	2,450	2.5	980	40.8
V.	8, p. m.	42	118	15, a. m.	39	75	2,875	6.5	442	18.4
VI.	16, p. m.	39	120	21, p. m.	32	65	3,300	5.0	660	27.5
VII.	21, p. m.	51	120	28, a. m.	32	65	3,450	6.5	531	22.1
VIII.	25, p. m.	51	120	27, a. m.	50	97	1,100	1.5	733	30.6
IX.	29, a. m.	42	93	*1, a. m.	48	68	1,400	2.0	700	29.2
X.	30, a. m.	51	120	*4, a. m.	47	71	3,000	4.0	750	31.2
Sums.							23,775	36.5	7,184	299.3
Mean of 10 paths.							2,378		718	29.9
Mean of 36.5 days.										27.1

* May.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*H. C. Frankenfield, Forecast Official.*

RIVERS AND FLOODS.

The stages of water in the Mississippi River were decidedly higher than during April, 1902, the excess ranging from 6 to 10 feet. Above the mouth of the Ohio the highest stages were due to the substantial and well distributed rainfall, while farther south the last of the flood waters of the preceding month of March passed slowly to the Gulf of Mexico, augmented by a moderate tide from the Ohio about the middle of the month. In fact, the crest of the flood of March, 1903, did not pass New Orleans until the 6th and 7th of April when a stage of 20.4 feet was reached, 4.4 feet above the danger line, and 0.9 foot higher than any previously recorded stage.

The arrival at St. Paul on the 14th of the steamer *Cyclone* marked the opening of through navigation on the Mississippi River for the season; it was seven days later than in 1902, when the same steamer was the first to pass through Lake Pepin.

Ice was last observed in the Missouri River on the 9th. Navigation at Pierre, S. Dak., was resumed for the season on the 6th, although the river was not entirely clear of ice until three days later. From the 5th to the 6th there was a rise at Bismarck, N. Dak., of 7 feet, of which the greater portion evidently came from the Yellowstone and Little Missouri rivers. The crest of this rise traveled steadily down the river, diminishing to about four feet by the time it reached Sioux City, Iowa, and to about two feet after leaving Kansas City, Mo. It reached St. Louis, 1330 miles from Bismarck, on the 18th.

The Illinois River continued above the nominal danger line throughout the month, the steady rains preventing any falls of consequence. No damage was reported.

Nothing of special interest occurred along the Ohio River, although the steady rains from the 7th to the 17th occasioned a sharp rise which was felt over the entire tributary district.